## PEER REVIEW HISTORY



## ARTICLE DETAILS

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| **TITLE (PROVISIONAL)** | Epidemiology of Competence: A Scoping Review to Understand the Risks and Supports to Competence of Four Health Professions |
| **AUTHORS** | Glover Takahashi, Susan; Nayer, Marla; St. Amant, Lisa |

## VERSION 1 - REVIEW

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| **REVIEWER** | Dale Dauphinee<br>McGill University, Montreal, Canada<br>FAIMER, USA |
| **REVIEW RETURNED** | 22-Nov-2016 |

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| **GENERAL COMMENTS** | Review of BMJ Open Manuscript 2016 – 014823<br>This submission is the expected follow-up report by this team from a 2014 BMJ Open article entitled: The epidemiology of competence: protocol for a scoping review. That publication presented the key issues around 'competence' and an outline of commonly used descriptions or subtopics within 'competence'. This is important as it oriented the current reader to the authors' awareness of the variation subject matter and complexity of the current 'competence' discussion. Furthermore, it helps to explain the reasons for using epidemiology as their conceptual model. Moving to the current submission, in its opening statement, the authors begin by stating that they are addressing a topic that is receiving a great deal of attention in the health professions education literature – Competency-based Medical Education (CBME) and note that it is an outcomes-based educational model. As they suggest, CBME is currently being 'heralded' as an alternative model to time based learning. They are not alone. It is a model which others have questioned as to its veracity and most importantly – its likely effectiveness or risks to learners and educational programs alike. Overall, in my view, it is appropriate and useful to frame this discourse in epidemiological terms. I will come back to this point later in my discussion of the paper's shortcomings because I will offer that epidemiology is a framework that offers additional advantages and insights for where their work needs to go next.<br>The decision of the authors to carry out a scoping literature review of possible benefits and risks of CBME in paragraph one is to be lauded. It will identify what is written and then provide a broad overview and possible frame work on to which they can map the results. This is outlined in their stated objectives – both now and in 2014. But the article quickly broadens its scope to the wider issue of 'competence' – a much more complex issue with social, educational and legal implications. So I looked back at the group's earlier publication and reviewed their current approach to a scoping review. After their initial digression on CBME (one aspect of the 'competence') in this submission, the authors' broader plans and description are consistent with current best practices for scoping |

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| | reviews.<br>Specifically, the outline of the actual scoping review process and its focus on four specific clinical fields were in keeping with the 2014 publication in BMJ Open. I have no quarrel with their methods or plan and they have followed through as should have been expected. However, once reaching the results and implications sections, I found my attention wandering. In short, I found this an extremely frustrating article to read. I saw many loose ends and a wide ranging attempt to combine everything under one broad domain of 'competence'. It is a complex issue with many levers and influences. It is as if they did not take to the last step and outline a clear pathway forwarded and, importantly, offer a taxonomy by which one can begin to parse and address the many issues. That would seem to me to be the logical response arising from a broad-based scoping review. Where next, what do we need next to move forward and why? They do offer suggestions but to me it falls short of engaging and informing the readers about what they would propose to do to better focus the discourse around 'competence'.<br>To expand on my perspective, let us return to the epidemiological model. It seems to me that there is a failure to appreciate what the epidemiology model has much to offer and that may be because the authors are not active in that field. Given that we start with a broad topic like of competence at the scoping level, we need to sort out its many parts and circumstances, and most importantly, the affected populations from both the professional levels of training to the educational communities' involvement as influencing agents. 'Competence' is not an epidemic of an insulting agent or biological 'outbreak'. Rather it is the proposers of 'unproven' change and educational promoters who are the external acting agents implicated in a social or educational 'outbreak'. Furthermore, to begin to make judgements or define risks or benefits (i.e. their phrase is 'supports' – but grant me 'benefits' to make my point), we must 'count' or describe something as it relates to each study population. One needs to have both a numerator and denominator for each study group and its environmental circumstance. Thus, to move from a scoping document to (and I quote from page 24) establishing an approach to 'understanding' (in objectives terminology this is a weak word – try inserting describing) the relative importance of different supports and risks. The authors 'get' the need to define the next steps forward but they need to sharpen their pencil and clarify in at least two major ways. One key message is be able to calculate rates or describe risks and benefits in precise actionable terms. Secondly, they should create a clinical taxonomy just like clinical epidemiologist or infectious disease experts do for illnesses and points of intervention) of for the various populations and their learning contexts – from student to clerks to residents to practitioners, etc. Their varying learning circumstances can help define potential points of influences and thus define actionable support steps. There is no good reason to lump populations together. The idea is to gather insights for support or risk management.<br>One final comment is offered. They tackle CBME as if it were an outcomes-based format. It is an 'outputs' based model for trainees but in practicing physician or physiotherapist terms, assessment of competence is measured in terms of true clinical (patient) outcomes or impact. It is another reason why some of these categories of professional population must be subdivided because context and educational and legal regulatory structures are vastly different. This better reflects use of the Logic Model as it applies to different changing educational environments and accountability of any |

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| | population of learners over its professional life cycle. For the MD the issue of both legal and regulatory contexts are essential elements in future planning because that where the responsibility lies.<br>In closing, from this admirable effort, the authors should offer some greater clarity and directions for the future. Any future development arising from this article should include a glossary of definitions surrounding 'competence' as well as a taxonomy for the stages of professional learning. That would enable unique calculations or descriptions of benefits and risks by stage of development.<br>Recommendations:<br>Revise the section on implications for clinicians and policy makers and for future work. Use the epidemiological model to guide the discussion of next steps and then you can begin to calculate or define risks and benefits to the professionals at the various stages of their careers. Remember, certain educational experts and regulators through their current proposals or theories are the epidemiological agents at work herein! The final question will be – are they correct or have we created a more confusing and unmanageable assessment maze! |

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| **REVIEWER** | Jann Torrance Balmer PHD RN FACEHP<br>University of Virginia School of Medicine<br>University of Virginia School of Nursing<br>Charlottesville Virginia<br>USA |
| **REVIEW RETURNED** | 01-Feb-2017 |

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| **GENERAL COMMENTS** | I think that this study is find and the reporting/article is accurate and appropriate. |

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| **REVIEWER** | Kim Lomis<br>Vanderbilt University School of Medicine, USA |
| **REVIEW RETURNED** | 03-Apr-2017 |

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| **GENERAL COMMENTS** | "Scoping" review<br>Does not attempt to draw conclusions about best practices<br>Useful to see how the issue of competence is being defined in the literature<br><br>This manuscript adds to the conversation about competence with a novel epidemiological approach. I like the framing of risk and support. That comes across as a less judgmental discussion of competence development.<br><br>Regarding the question whether the references are up to date?<br>This review covers articles thru 2014. As authors point out, rapid expansion recently, so many even more recent publications not included.<br>It would be difficult to get in front of that issue with a hot topic, but it is a limitation. Much recent learning from the US milestones project may not be reflected. However I am not immediately aware of major factors (risks or supports) that are not captured here.<br>I like the details included in the supplement, highlighting specific articles. |

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| | CanMEDS Roles<br>The authors report that the majority of articles were limited to considering the Medical Expert role.<br>Since half of the publications were from the US, is this translation between CanMEDS and ACGME domains correct? In ACGME framework, many articles refer to development of all competency domains (rather than only "Medical Knowledge"), and thus would be relevant to more of the CanMEDS roles (communicator, etc). Would help to elaborate on how an article was tagged as only addressing medical expert role<br><br>Generally very clearly written<br>A few suggestions:<br>Table 1 (and text)<br>I struggled with the distinction between<br>-Lack of clinical exposure/experience<br>-Adequacy of practice or education<br>I interpreted "practice" in a clinical context - may be worthy of explicit clarification in the text.<br><br>Page 22, Line 20<br>"That articles on physicians...."<br>Complex sentence - I had to read this a couple times to follow. Consider simplifying the flow.<br><br>Page 25, Line 6<br>"target" possibly intended to read "targeted"?<br><br>Statistical analysis<br>I am personally not capable of critiquing the regression analysis, but I can follow the author's reasoning and the authors are forthright about limitations |

**VERSION 1 – AUTHOR RESPONSE**

Reply to Reviewer #1

4. We have provided further context around CBE which serves to better situate our research and underpin its contribution to the current body of literature. (Introduction, 2nd paragraph, page 6).

5. The value add of using epidemiology as a framework has been enhanced in the Introduction (2nd paragraph, page 6), in the Strengths and limitations of this study section (page 22, last paragraph), in the Implications for clinicians and policy makers section (page 24, last paragraph) and in the Future work section (page 25)

6. Under Implications for clinicians and policy makers we have reworded from "describing" to "quantifying" (page 24, 2nd paragraph)

7. In the Future Work section we have enhanced the suggestion to utilize real data sets from medico-legal organizations and regulatory authorities to investigate relative risks and supports to competence (last paragraph page 25).

8. In the Future work section we have added a suggestion to investigate the impact of the different supports for the different life cycles (page 25, last paragraph)

9. In the Implications for clinicians and policy makers section we have revised wording to enhance the clarity of the implications

10. Re reviewer comment: "Any future development arising from this article should include a glossary of definitions surrounding 'competence' as well as a taxonomy for the stages of professional learning. That would enable unique calculations or descriptions of benefits and risks by stage of development."

o We have clarified that developing a glossary was a key step (Methods section, page 8, second

paragraph, last sentence) and how the current definitions could be built on or calculated for different contexts (Future directions section, page 25, first sentence)
11. Re reviewer comment: “It is a complex issue with many levers and influences. It is as if they did not take to the last step and outline a clear pathway forwarded and, importantly, offer a taxonomy by which one can begin to parse and address the many issues. “
o Please see Table 1 for descriptions of the risks and supports definitions for descriptions
12. Re reviewer comment related to the vast differences in educational and regulatory structures between professions
o Specific differences between the educational and regulatory structures between professions were beyond the scope of this paper. This was indirectly referred to as the different contexts and priorities of the professional groups.
13. Re reviewer suggestions for “Future Work” section
o Added additional clarifying information in Implications section and Future Work section, Page 24 and 25 respectively.
14. Re reviewer suggestion to develop a glossary of definitions surrounding competence and taxonomy for stages of professional learning, which would allow for unique calculations/descriptions of benefits & risks by stage of development.
o See comments in note 10 above regarding additions and edits made.
15. Re reviewer suggestion to create a clinical taxonomy of various populations and their learning contexts (just like clinical epidemiologists do for illnesses & points of intervention).
o See comments in note 11 above regarding additions and edits made

Reply to Reviewer #2
16. Thank you for your comments.

Reply to Reviewer 3
17. Elaborated on how articles were coded as addressing the Medical Expert CanMEDS Role, by providing an example in the Methods section, in the last paragraph under Data Extraction (bottom of page 11, top of page 12).
18. We sought to clarify what was meant by the competency continuum stage of “practice” by replacing this with “clinical practice” throughout the manuscript.
19. We provided further clarification on the difference between the “lack of clinical exposure/experience” and “adequacy of practice or education” in the Inclusion criteria and article selection process (page 9), the Risks and supports to competence section (page 16) and by italicizing key phrases for emphasis in Table 1 of Supplement 2.
20. Re “complex sentence” on page 22, we re-worded this complex sentence for clarity, now found on page 22, 2nd paragraph.
21. “Target” on page 28, line 1, has been changed to “targeted”, as suggested, now line 1 on page 24.

**VERSION 2 – REVIEW**

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| **REVIEWER** | Dale Dauphinee<br>McGill University - Canada<br>Foundation for the Advancement of International Medical Education and Research (FAIMER) - USA |
| **REVIEW RETURNED** | 13-Jun-2017 |

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| **GENERAL COMMENTS** | Epidemiology of Competence: A Scoping Review to Understand the Risks and Supports to Competence of Four Health Professions<br><br>The revised version of the Epidemiology of Competence paper has been revised significantly in two ways: the flow is much improved by |

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| | very good editing and by the use of more precise words and descriptions of key concepts. It is now much easier to read for readers (educators) who do not normally work in the epidemiological field or who are not engaged in the competence movement discussions. The manuscript has also been greatly improved by the rewording and clarification of the longer term benefits of using the epidemiological framework to describe and classify various relationships and associations that can bear on the use of competence in health sciences education. The use of the epidemiological framework and an improved taxonomy for the field of risks and supports around competence has been clearly outlined in the discussion sections and in the statement of future work.<br>I have no further comments and fully support the publication of this very large and insightful research effort. It will be a key contribution in a field that is long on rhetoric and in need of more careful parsing and analysis. Well done. |